ELASTIC SEAL FOR A GUIDE ROLLER

BACKGROUND

This invention relates to a guide roller with at least one roller body set and an inner race in the form of a bolt or pin that is located inside a receiving hole of an outer race. The inner race has a shoulder at each exterior axial end that is held within a first groove of the outer race so that axial shifting of the outer race with respect to the inner race is limited. A second groove exists inside the first groove that is offset inward in the axial direction and outward radially. A sealing element is located inside of this second groove.

A guide roller of this general type that is sealed in this way is known from DE-OS 22 40 144. It is formed of a shoulder pin that simultaneously constitutes the inner track for a set of bearing needles, whereas the outer track is formed from a thick-walled outer ring that has a hole in it to receive the pin. The thick-walled outer ring has a groove at both axial ends in which a sealing ring is placed. This sealing ring is designed with a reverse L shape. Its long side sits against a front face of the groove and its short side is held in another groove that is offset outward in the radial direction with respect to the first notch. This second short side turns inward in the radial direction and has a sealing lip lying against the shoulders of a pin and a butt ring.

The disadvantage in this setup is that this sealing ring is designed in very compact fashion, i.e. is not very flexible, so that re-greasing is only possible under very difficult conditions. In order to change the grease, i.e. to flush the lubricant, a very high pressure has to be applied. This high pressure could lead to damage to the installed sealing ring over time.

SUMMARY

The object of the invention is therefore to develop a seal of the above type for a guide roller that does not exhibit the above disadvantages, i.e. allows for improved re-greasing.

According to the invention, this object is met by the characterizing portion of claim **1** in that the sealing element is designed in a single piece in a T-shape in such a way that a first axial sealing portion is placed securely onto the shoulder, a second sealing portion is positioned in the second groove and extends radially outward and a third sealing portion extending radially inward branch off from the first sealing portion at its inner end so that axial contact between the shoulder and the outer race is prevented by the third sealing portion.

The first axial sealing portion provides a secure hold of the three-part seal by means of it being solidly seated on the shoulder. In this way, it is advantageous that the radial thickness of the first sealing portion be selected so that only a very minimal gap remains between it and the outer race. This minimal gap prevents the penetration of dirt into the bearing interior. The second sealing portion extending radially outward at the inner end thereof, and is designed as a flexible sealing lip that forms a labyrinthine seal with the second groove of the outer race. This again prevents the penetration of dirt into the bearing interior. The third sealing portion extending radially inwardly has the function of preventing contact between the shoulder and the outer race, i.e. the contact of metal with metal. This eliminates metal abrasion and thus contamination of the lubricant, which is associated with a reduction of the lifespan.

Other advantageous embodiments of the invention are described in claims **2** through **7**.

According to claim **2**, the third sealing portion takes a direction that deviates in the radial direction by an angle a

with respect to a perpendicular median. This slanted position serves to cushion the outer race when it shifts axially and at the same time it functions similar to a frictional seal. This slanted position, i.e. by keeping the contact surfaces away from each other, keeps the frictional moment of the bearing as small as possible.

In an additional feature according to claim **3**, the third sealing portion is provided with slots at an even distance from one another around it. These slots can be used on the one hand as an additional lubricant reservoir and on the other hand can provide for the free exchange of lubricant inside the bearing. The lubricant can flow out under pressure during re-greasing so that an evenly distributed exchange of lubricant is possible.

Claim **4** indicates that the second sealing portion, the sealing lip, assumes an alignment that deviates by an angle β from a perpendicular median in the radial direction. This ensures that the second groove is subdivided by the sealing lip into two spaces that can also be used as a lubricant reservoir. The grease rims forming in this space also provide an added seal for the bearing against contamination.

In another feature of the invention according to claim **5**, its flanges should be formed by a shoulder permanently attached to the pin on one side and by a stop ring on the other side that is pressed against the shoulder pin.

Finally, according to claim **6**, the roller body set of the guide roller is designed as cage guided needle bearings. According to claim **7**, the pin has an axial lubricant bore and a radial lubricant bore branching off from it that opens up into the track area of the roller set. In this way, the bearing can be effectively greased.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is explained in more detail in connection with the following embodiment.

In the drawings:

FIG. **1** is a side view of a guide roller according to the invention, partially in cross-section, with a neutral outer ring position;

FIG. **2** is an enlarged representation of the sealing element according to FIG. **1**;

FIG. **3** is a side view of the sealing element according to FIG. **2**; and

FIG. **4** is another side view of a guide roller according to the invention, partially sectioned, with a shifted outer ring position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The guide roller shown in FIG. **1** is formed from a bolt or pin **2** acting as an inner race, and of the outer race **10**, between which bearing needles **8** ride on associated tracks **6** and **9**, guided by a cage **7**. Here, the outer race **10** is shown in a neutral position, i.e. its central section, which constitutes track **9**, is at the same distance from shoulder **1** of pin **2** as it is from the stop ring **11**. The pin **2** includes a centrally located axial grease bore **4**, from which radial grease bore **5** branches off in the center section **3** and opens up into the inner track area **6**. The outer race **10** has a receiving opening **18** for the pin **2**, with enough intermediate space for the bearing needles, with a first groove **12** located at both of its ends into which the shoulder **1** of the pin **2** and the stop ring **11** are placed. This configuration ensures that shoulder **1** and stop ring **11** limit any axial shift of the outer race **10**.

As seen in FIG. **1** and in particular in FIG. **2**, the second groove **13** branches off from the first groove **12** and extends